

TECHNICAL MANUAL FOR



Reuse It New Jersey !

RECLAIMED WATER FOR BENEFICIAL REUSE

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DIVISION OF WATER QUALITY

DEPARTMENT OF ENVIRONMENTAL PROTECTION

INTRODUCTION

This manual was developed to assist you in implementing a reclaimed water for beneficial reuse (RWBR) program for a wastewater treatment plant. RWBR programs may only be authorized by the Department under the authority of a NJPDES discharge permit.

The importance of RWBR programs first came to light during the drought of 1999 when we experienced firsthand the importance of protecting and conserving our potable water supplies. During the drought emergency many wastewater facilities received authorization, under the NJDEP Administrative Order 1099-10, to reuse their effluent in a myriad of applications. Following the drought of 1999 and the expiration of the authorizations under Administrative Order 1099-10, several facilities have taken the next step, incorporating effluent reuse as part of their NJPDES permit on a more permanent basis.

Reclaimed wastewater, which was once considered a waste for disposal, is now a resource desired by commercial entities, municipalities, county parks, and various recreation departments, and residential developments. N.J.A.C. 7:14A-2.1 established a responsibility for the Department to encourage and promote RWBR and water conservation. As a result, the Department's policy encourages applicants to evaluate alternative wastewater management techniques before submitting a permit application. These evaluations should include public health, economic, scientific, energy, engineering and environmental considerations. The ultimate goal is the development of environmental alternatives that provide the most economic and energy efficient RWBR methods.

This manual includes design, operation, and maintenance criteria for wastewater systems discharging reclaimed water for beneficial reuse. Using this manual, treatment plant owners can establish flexible designs and sound engineering practices for managing wastewater in an environmentally sound manner. The manual is also intended to ensure wastewater discharges are free from substances that pose a serious threat to the public health, safety, and welfare.

The manual also includes:

- Effluent treatment level requirements for RWBR,
- Details on the documents and reports needed to receive a "Reuse Site" approval from the Department,
- An explanation of the approval process, the operations protocol process, and the report review,
- How to implement a RWBR Program at your site, and
- A summary table (Appendix A) of the treatment requirements for various reuse applications.

WHAT IS RECLAIMED WATER FOR BENEFICIAL REUSE?

Reclaimed Water for Beneficial Reuse (“RWBR”) involves taking what was once considered waste product, giving it a high degree of treatment and using the resulting high-quality reclaimed water for beneficial uses. In other words, the reclaimed water is used to replace or supplement a source of ground water or potable water consumption.

Depending upon the specifics of an application, extensive treatment and disinfection may be required to protect public health and environmental quality, while other applications involving limited public accessibility may not need a high level of treatment.

The following are just a few of the benefits of reuse:

- Reuse reduces demands on valuable ground water supplies, used for drinking water and irrigation.
- Reuse helps reduce pollutant loading to surface waters.
- Reuse may postpone costly investment for development of new water sources and supplies.
- Reuse allows multiple uses of land for agriculture and reuse of reclaimed water.
- Reuse can save money and can provide aesthetic value.

EXAMPLES OF REUSE APPLICATIONS

Properly treated wastewater effluent has been used to augment potable water resources for decades and many states have highly successful reuse programs. There are many applications for RWBR. RWBR may not be utilized for activities associated with primary contact recreation. Primary contact recreation is defined as water-related recreational activities that involve significant ingestion risks including, but not limited to, wading, swimming, diving, surfing, and water skiing.

The following are some specific examples:

Landscape Irrigation — Reclaimed water can be distributed for irrigation of parks, golf courses, baseball/soccer/football fields, highway medians, cemeteries, and even residential lawns.

Agricultural Irrigation — Reclaimed water can safely be used to irrigate pasturelands and crops.

Industrial Uses — Industrial facilities and power plants can use reclaimed water for cooling equipment, parts washing and cleaning, equipment operation and various other manufacturing processes.

Fire Protection — Reclaimed water can be supplied to fire trucks, hydrants and sprinkler systems for fire fighting.

Aesthetic Fountains and Lagoons — Reclaimed water can be used in decorative ponds, fountains, and other landscaping features.

Construction Uses — For dust control, reclaimed water can be used at construction sites, landfills, and quarries. It can also be used for washing aggregate and making concrete.

Miscellaneous — Reuse water can be used as a water supply for commercial laundries, for vehicle washing, to flush sanitary sewers and reuse water lines, and to manufacture ice for ice rinks.

Other RWBR Applications

The Department may approve other uses of reclaimed water if the following requirements are met:

- (1) All requirements of this manual are met; and
- (2) The engineering report provides reasonable assurance that the intended use will meet applicable rules of the Department and will protect public health and the environment.

PLANNING RECLAIMED WATER FOR BENEFICIAL REUSE SYSTEMS

According to the EPA's Manual, *Guidelines for Water Reuse* (document # EPA/625R 92/004), planning is a fact-finding phase meant to rough out physical, economic, and legal bounds to a water reuse plan. The primary tasks are to:

- 1) locate potential sources of effluent for reclamation and reuse,
- 2) locate all potential markets for reclaimed water, and
- 3) develop good working relationships among wastewater managers, water supply agencies, and potential reuse water users.

There are many areas that need to be examined, such as institutional constraints, public perceptions and environmental impacts to list a few. EPA's manual identifies the following issues that should be addressed during the planning phase:

- What local sources of effluent might be suitable for reuse?
- What are the potential local markets for reuse water?
- What public health considerations are associated with reuse, and how can these be addressed?
- What are the potential environmental impacts of water reuse?
- How would water reuse "fit in" with present uses of water resources in the area?
- What are the present and projected user costs of freshwater in the area?
- What existing or proposed laws and regulations effect reuse possibilities in the area?
- What local, state or federal agencies must review and approve the implementation of a reuse program?
- What are the legal liabilities of a purveyor or user of reclaimed water?
- What sources of funding might be available to support the reuse program?
- What reuse system would attract the public's interest and support?

After addressing the above issues, screening potential markets becomes essential. *Guidelines for Water Reuse*, contains a wealth of information on screening potential markets and evaluating selected markets. It is highly recommended that you obtain a copy of this document as well as EPA's *Municipal Wastewater Reuse Document* (# 430/09-91-022). To obtain these documents, visit EPA's web site at www.epa.gov or contact your regional EPA office.

For water reuse planning, one must consider the intended purpose of the reuse water. This planning involves determining both effluent quality and quantity. For example, if golf courses were to be your major effluent re-users, the greatest demand for reclaimed water would most likely be in the summer months. Both diurnal and seasonal fluctuations in supply and demand must be taken into account as well as industrial contributions to the wastewater treatment facility. Wastewater treatment facilities that receive substantial amounts of high-strength industrial wastes may be limited in the number and types of suitable reuse applications.

Finally, environmental impacts must be evaluated when planning reuse. Elimination or reduction of a surface water discharge by reclamation and reuse generally reduces adverse water quality impacts to a receiving stream. However, the implementation of reuse systems may have secondary environmental impacts that may need to be addressed as part of the planning and review process.

Minimum Effluent Treatment Requirements for RWBR

The planning process should include a close examination of your existing facility to determine what changes are necessary to meet the water quality and distribution requirements associated with your desired RWBR application. It is important to note that high-level treatment requirements only apply when reclaimed water is distributed directly to the reuse location and only to that portion of the water that is to be reused. Additional effluent monitoring in many instances will be required when distributing effluent to reuse locations to ensure its safe and proper use. Monitoring results of the reclaimed water will appear on the facility's Discharge Monitoring Report (DMR) in the form of "Report Only" requirements rather than as effluent limitations on the DMR because RWBR effluent treatment requirements will be included in the narrative requirements of Part IV of the facility's operations permit. It is important to note that high-level treatment requirements only apply when reclaimed water is distributed directly to the reuse location and only to that portion of the water that is to be reused. If a facility is unable to meet the treatment requirements of RWBR, it must divert its effluent to the existing, approved disposal system.

One of the most critical objectives in a reuse program is assuring public health protection is not compromised through the use of reclaimed water. Other objectives, such as meeting user requirements, avoiding public nuisances and preventing environmental degradation, are equally important. However, the starting point remains the appropriate treatment of the reuse water.

The presence of toxic chemicals and pathogenic microorganisms in untreated wastewater creates the potential for adverse public health effects. Protection of a receiving stream and public health is achieved by reducing concentrations of pathogenic bacteria, parasites, enteric viruses and controlling the level of chemical pollutants.

Traditional wastewater treatment processes reduce the concentrations of wastewater pollutants to levels protective of a receiving water since the potential for human contact, inhalation and/or ingestion is minimal. When considering RWBR, an additional level of public health protection is necessary to further reduce pathogenic organisms. Advanced wastewater treatment processes are generally utilized for this purpose, particularly when high quality reclaimed water is necessary for the irrigation of urban landscaping and food crops, contact recreation, and many industrial applications.

Chemical coagulation and filtration followed by chlorine disinfection to reduce bacteria to very low coliform levels and adequately inactivate pathogens. This form of disinfection has demonstrated the ability to remove or inactivate 5 logs (99.999 percent) of seeded poliovirus. Ultraviolet (UV) disinfection has been incorporated into ground

water discharges and more recent studies have shown UV disinfection to be as effective as chlorination, especially with respect to pathogen inactivation. UV disinfection has also shown the ability to remove or inactivate 5 logs (99.999 percent) of seeded poliovirus. When used in conjunction with conventional treatment technologies, these systems can produce effluent essentially free of measurable levels of pathogens.

It is important to remember that it is not always necessary to treat your entire wastewater flow to RWBR standards. Only that portion of the flow that will be reused is required to meet the RWBR standards, although it may be easier or more practical to treat the entire flow in many circumstances. Some of the principal wastewater treatment processes to consider for water reclamation reuse are identified below.

Filtration is a common treatment process used to remove particulate matter. Filtration involves the passing of wastewater through a bed of granular media or membranes that retains solids. Removal efficiencies can be improved through the addition of certain polymers and coagulants. A filtration system prior to a disinfection system should be considered as part of the overall treatment process.

Nitrification is the term generally given to any wastewater treatment process that biologically converts ammonia nitrogen sequentially to nitrite nitrogen and nitrate nitrogen. Nitrification does not remove significant amounts of nitrogen from the effluent, it only converts it to another chemical form. Nitrification can be accomplished in many suspended and attached growth treatment processes when they are designed to foster the growth of nitrifying bacteria. A well-designed and operated nitrification process will produce an effluent containing 1.0 mg/L or less ammonia-nitrogen. Ammonia-nitrogen can also be removed from effluent by several chemical and physical treatment methods such as air stripping, ion exchange, Reverse Osmosis, and breakpoint chlorination, although these methods tend to be uneconomical or difficult to operate in municipal applications. Ammonia removal should be examined closely, when considering reuse, especially since it is the first step for biological denitrification.

Denitrification is any wastewater treatment method that completely removes total nitrogen. Total nitrogen will be a limiting effluent parameter when reviewing most reuse applications, especially the land application of reuse water by spray irrigation. As with ammonia removal, denitrification is usually best done biologically for most municipal applications. Biological denitrification processes can be designed to achieve nitrogen concentrations between 2 mg/L and 12 mg/L nitrate-nitrogen. Denitrification may also be required when using effluent for agricultural irrigation of certain crops during specific times in the growing cycle (such as corn).

Nitrogen removal may have to be considered when planning a reuse program at your facility. Either chemical or biological methods or a combination of the two can remove nitrogen. The choice of methods will depend on site-specific conditions. A site evaluation and the engineering report submitted to the Department (as identified later in this manual) will help determine the extent of nitrogen removal required.

Other processes may also have to be examined, again dependent on the source of wastewater and the intended reuse application. Carbon adsorption treatment, for example, will remove several metal ions, particularly cadmium, hexavalent chromium, silver and selenium. Activated carbon has been used to remove unionized species such as arsenic and antimony from an acidic stream and it also decreases mercury to low pH values.

For all reuse applications, a requirement to monitor the amount of RWBR supplied, as well as where the RWBR is utilized will be required.

The type of RWBR you intend to produce and supply will be dependent upon the findings in your planning phase as well as the capabilities of your wastewater treatment facility. NJDEP has identified four main categories of RWBR and the specific requirements for each. However, reuse is not limited to these four categories and other opportunities may exist that require additional or less treatment requirements. Those opportunities will be examined on a case-by-case basis. Following are the four primary categories identified by NJDEP:

Category I. RWBR - Public Access Systems

Public Access RWBR involves the use of reclaimed water where public exposure is likely, thereby necessitating the highest degree of treatment. Typical examples of these applications include; spray irrigation of golf courses; baseball/soccer/football fields and parks; irrigation of landscaped areas; highway median strip irrigation and/or decorative outdoor fountains. In order to qualify for Public Access RWBR, the minimum design capacity of the wastewater treatment plant should be 0.1 million gallons per day (MGD).

In addition to the minimum treatment requirements for public access reuse identified below, RWBR must also meet all the treatment effluent standards specified in the permit, prior to distribution to the reuse location.

Disinfection

Where chlorine is utilized for disinfection, a total chlorine residual produced oxidant of at least 1.0 mg/L shall be maintained for a minimum contact time of 15 minutes at peak hourly flow. The treatment facility shall provide continuous on-line monitoring for chlorine residual/chlorine produced oxidant (CPO) at the compliance monitoring point. For spray irrigation, CPO levels for disinfection should be continually evaluated to ensure chlorine residual levels do not adversely impact vegetation at an application site.

Where ultraviolet disinfection is used, a design UV dose of 100 mJ/cm² under maximum daily flow must be used. This dose must also be based on continuous monitoring of lamp intensity, UV transmittance and flow rate. All aspects of the UV system must meet the requirements of the December 2000 National Water Research Institute's *Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse*.

The use of alternative methods of wastewater disinfection, such as ozone disinfection may satisfy the high-level treatment requirements of public access reuse water. However, the permittee shall submit the following information in support of a request to use an alternative method of disinfection for reuse:

- 1) The operating protocol as per the "Permitting Procedures and Requirements" section of this manual; and
- 2) Statistically significant monitoring data, indicating compliance with the 2.2 fecal coliforms per 100 ml requirement for reuse water.

Fecal Coliform

Fecal coliform concentrations shall not exceed 14 fecal coliforms per 100 mL at any given time (as an instantaneous maximum level). Fecal coliform concentrations must also meet a weekly (7 day) median value of 2.2 fecal coliforms per 100 mL.

Total Suspended Solids (TSS)

Total suspended solids (TSS) shall not exceed 5.0 mg/L before disinfection. Continuous monitoring for turbidity before disinfection will be required. A statistically significant correlation between turbidity and TSS shall be established prior to commencement of the RWBR program. This correlation should be done as part of a daily monitoring program for at least 60 days. As part of the operations protocol, to ensure continuous compliance with the 5.0 mg/L TSS limitation, turbidity must be monitored continuously and TSS at least weekly. The correlation established for the facility, between TSS and turbidity, must be updated at a minimum on an annual basis.

TSS levels are also significant depending upon the method of disinfection used. In the case of chlorination, in no case shall the level of TSS exceed 5 mg/l. For UV disinfection, in no case shall the level of turbidity exceed 2 nephelometric turbidity units (NTU) while still maintaining the 5 mg/l maximum level for TSS. RWBR limitations shall be met both before and after disinfection for TSS or turbidity and prior to discharge to a reuse location. Only RWBR meeting the conditions detailed in the approved "Operating Protocol" shall be released to the reuse location.

Total Nitrogen

RWBR limitations shall not exceed a total nitrogen concentration of 10 mg/L. The Department may impose a total nitrogen concentration limitation greater than 10 mg/L if the permittee can demonstrate that a concentration greater than 10 mg/L is protective of the environment. To justify a greater than 10 mg/L total nitrogen concentration limitation, the permittee shall submit the additional specified information listed under the Engineering Report, Parts C through F.

Loading Rate

The Department requires that any surficial application of RWBR be done in a manner that prohibits sheet flow, runoff conditions or persistent ponded water on the ground surface. Without conducting a subsurface evaluation, the hydraulic loading rate for

RWBR for surficial irrigation (spray, ridge and furrow, etc.) may not exceed a maximum annual average of two (2) inches per week. The Department may authorize a higher hydraulic loading rate if a permittee can demonstrate that a higher rate is warranted. To justify an increase in hydraulic loading rates, the permittee shall submit the additional specified information listed under the Engineering Report, Parts C through F. For applications other than surficial irrigation, a loading or volumetric rate will be established on an individual application basis and should be thoroughly justified in your proposal to the Department.

Category II. RWBR - Restricted Access and Non Edible Crop Systems

Restricted access and non-edible crops RWBR involves the use of reclaimed water where public exposure is controlled; therefore, treatment requirements may not be as demanding as in a public access RWBR system. Examples of restricted access and non-edible crops RWBR may include activities such as spray irrigation of sod farms and pasturelands, or similar areas where the application area is restricted to public access. These systems do not include the irrigation of edible crops.

Total Nitrogen

RWBR Restricted Access Spray Irrigation limitations shall not exceed a total nitrogen concentration of 10 mg/L. The Department may impose a total nitrogen concentration limitation greater than 10 mg/L if the permittee can demonstrate that a higher concentration is protective of the environment. To justify a greater than 10 mg/L total nitrogen concentration limitation, the permittee shall submit the additional specified information listed under the Engineering Report, Parts C through F.

Hydraulic Loading

The hydraulic loading rate for RWBR restricted access spray irrigation shall not exceed a maximum annual average of two (2) inches per week per site. The Department may authorize a higher hydraulic loading rate if the permittee can demonstrate a higher rate is protective of the environment. To justify an increase in hydraulic loading rates to the Department, the permittee shall submit the additional specified information listed under Section I, Engineering Report, Parts C through F.

Disinfection

The treatment facility shall establish a written standard operating procedure ("SOP") that ensures all effluent that is utilized for RWBR has satisfactorily met the disinfection requirements. The SOP required for RWBR shall be made available to the Department, upon request. CPO levels should be continually evaluated to ensure the RWBR will not adversely impact vegetation. For restricted access spray irrigation applications, the fecal coliform concentration shall not exceed a geometric mean value of 200 fecal coliforms per 100 mL. Any one sample shall not exceed any instantaneous maximum value of 400 fecal coliforms per 100 mL.

Where ultraviolet disinfection is used, a design UV dose of 75 mJ/cm² under maximum daily flow must be used. This dose must also be based on continuous monitoring of

lamp intensity, UV transmittance and flow rate. All aspects of the UV system must meet the requirements of the December 2000 National Water Research Institute's *Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse*.

The distribution of RWBR shall not produce surface runoff or ponding for any significant amount of time. Land application sites shall not be frozen or saturated when applying RWBR. For a period of 15 days from the last application of reclaimed water, land application areas shall not be used for the grazing of cattle whose milk is intended for human consumption. There are no restrictions on the grazing of other cattle.

Category III. RWBR - Agricultural Edible Crop Systems

This use of reclaimed water involves the irrigation of edible crops. The same high-level treatment requirements associated with public access uses also apply to reuse for edible crops. The following additional requirements also apply:

- (1) Spray irrigation of edible crops is only allowed if those crops will be peeled, skinned, cooked or thermally processed before consumption.
- (2) Using an application method that allows for direct contact of reuse water on edible crops that will not be peeled, skinned, cooked or thermally processed before consumption is prohibited. However, it is permitted to use an indirect method that precludes direct contact with the reclaimed water (such as ridge and furrow irrigation).
- (3) The permittee shall submit to the Department, as part of the authorization request, a listing of the inventory of commercial agricultural operations using reclaimed water to irrigate edible crops. In addition, an inventory of edible crop irrigation shall be submitted annually to the Department with the annual report of reclaimed water utilization. The inventory of edible crop irrigation shall include the following:
 - a. Name of the agricultural operation.
 - b. Name and telephone number of the owner or operator of the agricultural operation.
 - c. Address of the agricultural operation.
 - d. Edible crops irrigated with reclaimed water.
 - e. Type of application (irrigation) method used.
 - f. Approximate area under irrigation on which edible crops are grown.
- (4) If requested, the Department may authorize special demonstration projects to collect and present data related to the direct application of reuse water on crops which are not peeled, skinned, cooked, or thermally processed before consumption. Crops produced during such demonstration projects may be used as animal feeds or may be thermally processed or cooked for human consumption.

- (5) The RWBR shall meet all treatment effluent standards in the permit, including the public access reuse high-level treatment standards prior to discharge to a reuse location. The spray irrigation of reclaimed water shall not produce surface runoff or ponding.

Category IV. RWBR - Industrial Systems, Maintenance Operations and Construction

Industrial RWBR involves the use of reclaimed water in industrial applications such as cooling water and/or washing operations. The uniqueness of each industrial reuse application makes it impossible to establish specific treatment standards for this general category of reuse. Prior to implementation, all industrial reuse systems require a case-by-case review by the Department. Some applications, such as the reuse of effluent for non-contact cooling water, may require very little, if any changes to the level of treatment the wastewater is already receiving at the wastewater treatment plant.

Examples of construction uses can be dust control, washing of aggregate, and/or the use of RWBR for cement mixing. Maintenance Operations activities utilizing RWBR can include sewer jetting, vehicle washing, and street cleaning to name a few. As with many industrial applications, construction and/or maintenance operations utilizing RWBR, the RWBR water may require very little if any changes to the treatment levels the effluent is already receiving at the wastewater treatment plant.

IMPLEMENTING AN RWBR PLAN

Permitting Procedures and Requirements

A decision to implement a reuse program should be based on the results of your planning investigations. Implementation of a RWBR Plan can only occur under the authority of a NJPDES Permit for a wastewater treatment facility. Below are the steps a NJPDES-permitted facility must follow to obtain Department approval for instituting a reuse program along with the reports and documents needed. (Note: New facilities require the information listed in this manual and a complete NJPDES permit application consistent with the requirements at N.J.A.C.7:14A– 4.)

All RWBR locations must be approved by the Department prior to the distribution of reclaimed water to a RWBR location. The Department's approval of those locations will be in the form of an administrative modification to an existing permit for each RWBR location. The regulation and management of individual users of reclaimed water will be administered by NJPDES permittees through binding agreements with individual users of reclaimed water or by local ordinance. NJPDES permittees shall not issue individual reuse water permits to individual property owners.

An individual RWBR permit may be issued to a RWBR location, if the RWBR location provides any additional treatment to reclaimed water received from more than one wastewater treatment facility, such as additional filtration and/or disinfection.

Engineering Report

An engineering report shall be submitted to the Department in support of reuse authorization requests for new or expanded RWBR projects.

The engineering report submission requirements for modifications to existing RWBR projects, Category IV RWBR (Industrial Reuse) and for those existing facilities which have had past violations of permit conditions or water quality standards shall be determined on a case-by-case basis by the Department. Such determinations shall be based on the frequency and severity of past violations, the potential for adverse affects on reuse water quality and on surface and ground water quality, and the scope of proposed modifications.

The **Engineering Report** for Categories I, II, and III RWBR shall include the following:

A. Land Use Requirements

- (1) The exact boundaries of the reuse project, with setback distances shown (see "Setback Distances" in this manual), shall be depicted on the most recent USGS topographic maps. These maps shall show present land uses within 0.5 miles of the site boundaries;

- (2) All potable and non-potable water supply wells and monitoring wells shall be located on USGS maps. The well depth, yield, and screen interval within a 0.5 mile radius of the reuse application sites shall be provided along with the use (e.g., potable) and ownership (e.g., private);
- (3) If expansion of an RWBR project is anticipated, the area likely to be used in the expansion shall be shown on the maps; and
- (4) Surface water locations, within 0.5 miles of the RWBR project site, shall be provided on the maps and shall include classification, uses, and approximate distance from the site.

B. Project Evaluation

- (1) An evaluation of the overall long-term effect of the proposed project on environmental resources in the area shall be provided. The evaluation shall include aspects such as changes in water table elevations due to natural fluctuations and the reuse project, prediction of the rate and direction of movement of applied reuse water, changes in water quality in the area associated with the project, and similar information.
- (2) Justification and documentation for using setback distances, selection of hydraulic loading rates, and loading and resting cycles shall be provided.
- (3) An evaluation of the proposed project with respect to public health, safety, and welfare shall be provided.
- (4) Forecasts of flows and reuse water characteristics for the current and design year shall be provided, including:
 - a. Physical, chemical, and biological characteristics and concentrations, and
 - b. Reuse water flow patterns – total annual, monthly average, daily average, daily maximum, and seasonal peak one-hour flow during current and design years.
- (5) A site plan showing existing and proposed operations and unit processes shall be provided.
- (6) Technical information and design criteria for a reuse/spray irrigation system shall be provided, including:
 - a. Hydraulic, organic, and nutrient loadings – minimum, average, and maximum quantities;
 - b. Flow metering (at the wastewater treatment facility);
 - c. Monitoring points; and
 - d. Concentrations of reuse water percolated to ground water or being discharged to surface waters, with supporting data including design calculations.
- (7) Operation and control strategies shall be provided.

C. Soils Information

(Required as a part of the Engineering Report, if a permittee is seeking approval for a greater than 2 inches per week hydraulic loading rate and/or greater than 10 mg/ L nitrate-nitrogen concentration limitation)

- (1) A soils map of the RWBR site shall be provided. The soils shall be named and described in accordance with the standard criteria (e.g. soil surveys) of the USDA, Unified or Burmeister Soil Classification System, and/or Rock Quality Description System unless advised by the soil scientist of the NRCS that soils present are not appropriate for such characterization.
- (2) Physical characteristics of each significant soil, subsoil, or substratum layer to a depth of 10 feet below the average water table, or to a 20-foot depth (as measured below the lowest point on the site) if no water table is encountered, shall be provided. Representative soil profiles of the site shall be provided. Soil characteristics such as texture, hydraulic conductivity, available water capacity, organic matter content, pH, sodium adsorption ratio, and cation exchange capacity should also be investigated. Appropriate chemical characteristics shall be determined for soil profile horizons active in the chemical and biological renovation of reclaimed water or effluent.

Specific sites used for determining hydraulic conductivity shall be shown on the soils map, and data shall be submitted to substantiate that the proposed site is hydrologically capable of accommodating the design loading and application rate.

- (3) For projects with an approved reuse location, where expansion of the existing site or the addition of a new similar reuse location (similar in soil, hydrogeologic and land management systems profiles), the Department may accept an abbreviated report of the soil characteristics at the proposed site (See Section "G")

D. Hydrogeologic Survey

(Required as a part of the Engineering Report, if permittee is seeking approval for a greater than 2 inches per week hydraulic loading rate and/or greater than 10 mg/ L total nitrogen concentration limitation)

- (1) Hydrogeologic data necessary to evaluate the capability of the proposed project to perform successfully at the site on a long-term basis shall be provided. This information shall include, but not be limited to, geophysical information concerning known "solution openings" and sinkhole features within one mile of the site; the identification (with applicable geologic sections), extent or continuity, and hydrologic characterization of aquifers and confining zones underlying the site (i.e., horizontal and vertical hydraulic conductivity, porosity, thickness); head relationships between aquifer systems; and information on the annual range of ground water elevations at the proposed site.
- (2) The velocity and direction of existing ground water movement, and the points of discharge, shall be shown on maps of the area. Similar information regarding

environmental impact conditions anticipated, as a result of the project shall be provided.

- (3) Information on potable and non-potable water supply wells (and monitoring wells, as appropriate, including the depth, length of casing, cone of depression and, geophysical surveys of the wells (if available) shall be provided.
- (4) Flood prone areas on the proposed site and within 0.5 mile of the site shall be located on a map. Flooding frequencies and magnitude shall be based upon New Jersey State Flood Plans.
- (5) For projects with an approved Reuse location where expansion of the existing site or new similar (similar in soil, hydrogeologic and land management systems profiles) public access spray irrigation sites, the Department may accept an abbreviated report from the permittee covering the hydrogeologic characteristics at the proposed site. (See Section "G" below)

E. Land Management System

(Required as a part of the Engineering Report, if permittee is seeking approval for a greater than 2 inches per week hydraulic loading rate and/or greater than 10 mg/ L total nitrogen concentration limitation)

- (1) The present and intended soil-vegetation management program shall be discussed and the reuse location's vegetative covers identified. Reclaimed water to be applied shall be characterized in terms of its physical, chemical, and biological properties. Data and other documentation to verify the uptake of nutrients (such as nitrogen and phosphorus), moisture and salt tolerances, pollutant toxicity levels, yield of crops and similar information shall be provided. For projects requesting authorization for reuse, detailed water and nutrient budgets (balances) shall be included.
- (2) Harvesting frequencies and the ultimate use of crops shall be indicated. Length of operating seasons, application periods and rates, and resting or drying periods shall also be described.
- (3) The best available information (and technical assistance) from organizations or individuals qualified in the agricultural/agronomic aspects of reuse and spray irrigation shall be used in the preparation of the above report information.
- (4) Plans for storage, reuse, or disposal of reuse during crop removal, wet weather, control of pests, equipment failures, or other problems precluding land application shall be described.

F. Pollutant and Hydraulic Loading Rates

(Required as a part of the Engineering Report, if permittee is seeking approval for a greater than 2 inches per week hydraulic loading rate and/or greater than 10 mg/ L total nitrogen concentration limitation)

- (1) Hydraulic loading rates shall be established after evaluating the soil-plant system's ability to remove pollutants from reclaimed water.

- (2) Nitrogen loading shall promote both the use by vegetation and nitrification-denitrification reactions in the soil. If supplemental fertilizers are used, the effect of such fertilizer use on nitrogen concentrations in ground water shall be assessed.
- (3) In establishing loading rates, the following additional factors shall be examined: the infiltration capacity and hydraulic conductivity of the geologic materials underlying the site, the resultant pollutant load's assimilative capacity within the soil-plant system, methods to eliminate surface runoff or ponding of the applied reclaimed water, and the quality and use of underlying ground water (which may dictate the loading rates to be used).
- (4) A justification for loading rates shall be included. This justification shall be based on the renovating and hydraulic capacity of the soil-plant system, the existing quality and use of surface or ground water in the area, and other relevant hydrogeologic conditions.

Additional Design Information – Note: Additional information may be required in the Engineer's report pursuant to the "Design Considerations" section (later in this manual).

G. Abbreviated Reports

For projects involving only the expansion of existing reuse sites in public access areas, the Department may accept an abbreviated engineering report with the following conditions:

- (1) The average annual hydraulic loading rate calculations shall be provided in the abbreviated report, and
- (2) No percolation to ground water is used in the water balance calculations.

Please contact the your case manager in the Division of Water Quality for specific abbreviated report requirements.

Operating Protocols

An operating protocol is a document, describing how a wastewater treatment facility is operated to ensure that only reuse water meeting the applicable standards is released to a reuse system. It is a detailed set of instructions for the operators of facilities. An operating protocol shall be submitted to the Department in support of all reuse authorization requests for RWBR. The requirement for an operating protocol may be waived by the Department for certain types of industrial reuse, depending on the intended reuse application if wastewater quality is not an issue for any reason. An operating protocol shall be approved by the Department before a reuse system is operated. Only operating protocols providing reasonable assurances that treatment and disinfection requirements will be met will be approved.

A. Minimum Operating Protocol Requirements

- (1) The criteria used to make continuous determinations of the acceptability of the reuse water being produced. This shall include the setpoints for parameters measured by continuous on-line monitoring equipment.
- (2) The physical steps and procedures followed by the operator when substandard water is produced.
- (3) The physical steps and procedures to be followed by the operator when the treatment facility returns to normal operation and acceptable quality reuse water is again being produced.
- (4) Procedures to be followed during a period when an operator is not present at the treatment facility.
- (5) The physical steps and procedures to be followed by the operator when the operator returns to the treatment facility, following an unattended period.
- (6) A New Jersey Licensed Professional Engineer certification that the reuse limitations can be met.

B. Operating Protocol Updates

The permittee shall periodically review and revise the operating protocol, as appropriate, to ensure satisfactory system performance. The operating protocol shall also be submitted for Department review with each permit renewal application. Renewal applications shall include the following:

- (1) Current procedures and criteria addressing the requirements of reuse.
- (2) Evaluation of the effectiveness of the procedures and criteria in ensuring that reuse requirements are met. This shall include an evaluation of any violations of permit requirements during the previous permit. This also shall include an analysis and correlation's of parameters monitored continuously against parameters regulated by the permit (for example, turbidity versus total suspended solids).

Reuse Supplier and User Agreement

A copy of all Reuse Supplier and User Agreements shall be submitted to the Department in support of reuse authorization requests. A Reuse Supplier and User Agreement is a binding agreement between the party (e.g., a wastewater treatment facility) who supplies reuse water and the user (e.g., privately owned & operated golf course or any other property owned by another party). The agreement is to ensure that construction, operation, maintenance, and monitoring for the reclaimed water meets the requirements of the NJPDES Rules and Regulations for reclaimed water. RWBR systems shall be operated and maintained to achieve applicable waste treatment requirements, before final release of reclaimed water to the user and the environment. The following requirements apply to Reuse Supplier and User Agreements:

- (1) Where the treatment/reuse/disposal system is under the direct control of the permittee for the useful life of the facilities, the permittee shall maintain control over, and be responsible for, all activities inherent to all reuse and reuse location application systems to ensure the entire reuse or waste treatment system operates as approved by the Department;
- (2) Where the wastewater treatment plant permittee reuses water using property owned by another party, a binding agreement between the involved parties is required to ensure that construction, operation, maintenance, and monitoring meet the requirements of NJPDES Rules and Regulations. Such binding agreements are required for all reuse sites not owned by the permittee. The permittee shall retain primary responsibility for ensuring compliance with all requirements of the NJPDES Rules and Regulations;
- (3) Reuse application systems using crops for the uptake of nutrients from shall provide for removal of the crop at appropriate intervals as described in the engineering report and as approved by the Department; and
- (4) The copy of the Reuse Supplier and User Agreement submitted to the Department shall detail how compliance with the reuse program requirements will be met.

Treatment Works Approval

Prior to construction and/or placing a reuse system into operation, a Treatment Works Approval (TWA) permit shall be required for:

- (1) All additional process units that may be added to a wastewater treatment facility to provide the treatment requirements for reuse, such as filtration systems and/or additional chlorine contact chambers. (Pond storage systems for reuse may not require a TWA. We suggest contacting your NJPDES permitting contact for any questions on this matter.)
- (2) All new transmission lines delivering reuse water to reuse locations. Additionally, all new reuse distribution systems may also require a TWA prior to being placed into operation. The Bureau of Engineering North or South (as applicable) should be contacted for TWA determinations in these situations. (North: 609-292-6894, South: 609-984-6840)
- (3) Existing distributions systems, such as those at golf courses, which will now also serve as a reuse distribution system, will not be required to get a new TWA, if a TWA was already issued for the distribution system.
- (4) Existing distribution systems without a TWA must submit to the Bureau of Engineering North or South, a complete TWA application along with a Professional Engineer's statement of certification, attesting to the integrity of the existing system for it's intended use.
- (5) TWAs shall comply with the requirements at N.J.A.C. 7:14A-22.

Cross-connection control

In support of reuse authorization requests, the permittee is required to comply with the New Jersey Safe Drinking Water Act, N.J.A.C. 7:10-10.I, Physical Connections and Cross Connections Control as well as the Plumbing Subcode of the New Jersey State Uniform Construction Code N.J.A.C. 5:23.

- (1) If the reuse distribution system is located at a site with a public community water system, a Physical Connect Permit Application shall be submitted to the Department's Bureau of Safe Drinking Water. A copy of the New Jersey Safe Drinking Water Act and Application Form for Initial Physical Connection Permit can be obtained by contacting the Department's Bureau of Safe Drinking Water at 609-292-5550.
- (2) If the reuse distribution system is located at a site with a non-community water or non-public water systems, a Physical Connect Permit Application is not required. Compliance with the Plumbing Subcode of the New Jersey State Uniform Construction Code N.J.A.C. 5:23 is still required.
- (3) Questions pertaining to public community water systems should be directed to the Department's Bureau of Safe Drinking Water. Questions pertaining to non-community water or non-potable water systems should be directed to the local plumbing subcode official. State or federal sites should direct their questions to the Department of Community Affairs.

DESIGN CONSIDERATIONS

Considerations for Cross-connection control

- (1) RWBR water shall not be in primary contact recreation applications.
- (2) RWBR water may be used to irrigate landscaped areas with a tank truck only if the following requirements are met:
 - a. The truck used to transport and distribute reclaimed water is not used to transport potable water that is used for drinking water or any other fluids intended for human consumption.
 - b. The distribution of reclaimed water is in accordance with the requirements of this manual: and,
 - c. The truck used to transport and distribute reclaimed water is not used to transport waters or other fluids that do not meet, at a minimum, the treatment requirements for reuse water as specified in this manual, unless the tank has been evacuated and properly cleaned prior to the addition of the reclaimed water.
- (3) Conversion of existing facilities.

- a. Existing water lines, sewers, and wastewater transmission lines may be converted for use as reclaimed water transmission lines with Department approval.
- b. Applicants wanting to convert these types of facilities to reuse water transmission lines shall comply with the TWA requirements in this manual as well as the requirements of Section 5 – “Cross Connection Control.”

(4) No cross-connections to potable water systems shall be allowed.

Setback distances

The following setback guidelines are the minimum requirements for each category of reuse. The Department may require additional or alternative setbacks based upon individual specific proposals for reuse. All minimum setback distances are calculated from the edge of the wetted perimeter of the particular RWBR application and should include considerations for aerosol transmission. Any category that does not require a setback means that RWBR may have a wetted perimeter up to the edge of that area, but may not contact or cross over the noted feature (i.e., buildings, roadways, property lines, public eating areas, bathing facilities, etc.) unless specifically authorized by the Department.

I. and III. Reclaimed Water for Beneficial Reuse for Public Access and Agricultural Edible Crops Systems

- (1) There shall be a setback distance of 75 feet from the edge of a wetted public access land application area to potable water supply wells that are existing or have been approved for construction (but not yet constructed). To comply with this requirement, a utility providing reuse water for residential irrigation may adopt and enforce an ordinance prohibiting private drinking water supply wells in residential areas. This setback distance requirement does not apply to closed loop heating or air conditioning return wells.
- (2) No setback distance is required to any non-potable water supply well.
- (3) A 75-foot setback distance shall be provided from a reclaimed water transmission line or land applied area to all potable water supply wells.
- (4) Setback distances for potable water supply wells shall be applied for new or expanded reuse projects.
- (5) Setback distances are not required for surface waters, other than Category 1 surface waters, or unprotected areas. Setback distances for Category 1 surface waters and other environmentally sensitive areas (Pinelands, shellfish beds, etc.) will be determined on a case by case basis.
- (6) Low trajectory nozzles, or other means to minimize aerosol formation shall be used within 100 feet from outdoor public eating, drinking and bathing facilities.
- (7) A setback distance of 100 feet shall be maintained from indoor aesthetic features (such as decorative pools or fountains) and adjacent indoor public eating and

drinking facilities when the aesthetic features and eating and drinking facilities are within the same room or building space.

- (8) The edge of the wetted perimeter of the RWBR application shall not cross into adjoining sites; properties or public roadways that are not part of the Department approved RWBR location.
- (9) Direct spraying or aerosol transmission of RWBR onto any structure or across property lines is prohibited. Additional setbacks from the wetted perimeter may be required for privately owned occupied dwellings adjacent to commonly owned or leased land utilizing RWBR.

II. Restricted Access for Agricultural Use

- (1) There shall be a setback distance of 500 feet from the edge of a wetted public access land application area to potable water supply wells that are existing or have been approved for construction (but not yet constructed).
- (2) No setback distance is required to any non-potable water supply well.
- (3) A 100-foot setback distance shall be provided from a reclaimed water conveyance or application location to a public water supply well.
- (4) Setback distances for potable water supply wells shall be applied for new or expanded reuse projects.
- (5) Setback distances of 500 feet from FW1 surface waters, Pineland Waters and Category 1 Shellfish Waters. All other surface water and wetland setback distances shall be established on a case-by-case basis.
- (6) Setback distances of 100 feet from any property line, outdoor public eating, drinking and bathing facilities.
- (7) The edge of the wetted area of the RWBR shall not cross into adjoining sites that are not part of the Department approved RWBR location.
- (8) Setback distances of 400 feet from any residence, dwelling or occupied structure.

Access Control and Advisory Signs

For RWBR for public access and agricultural edible crops, no access control provisions are needed. However, the public shall be notified of the use of RWBR. This shall be accomplished by posting advisory signs designating the nature of the reuse project area where reuse is practiced, notes on scorecards, or by other methods. International signage is also encouraged. Examples of some of the notification methods include posting of advisory signs at entrances to residential neighborhoods where reuse water is used for landscape irrigation, and posting advisory signs at golf course entrances and at the first and tenth tees. The use of purple as a prominent color on advisory signs and written notices related to a reuse project is recommended and encouraged, but is not required.

For RWBR for restricted access, access controls are needed and appropriate advisory signs designating the location as "Restricted Access" shall be posted around the site

boundaries to designate the nature of the project area. For RWBR for restricted access and agricultural crops (edible or non-edible), all employees with access to the areas where RWBR is being applied must be notified in writing of the activity and must receive awareness instruction with respect to the exposure of RWBR which does not meet public access criteria. This awareness instruction must be specified in the RWBR Operations Protocol.

Storage Requirements

System storage shall not be required when another permitted reuse system or effluent disposal system is incorporated into the system design. If system storage is not required, flow equalization or storage provisions should be evaluated in the engineering report to ensure reuse water flows will match the demand pattern during a diurnal cycle. If system storage ponds are utilized, they do not have to be lined. However, reject storage ponds shall be lined or sealed to prevent measurable seepage and minimize potential subsurface impacts.

Existing or proposed ponds (such as golf course ponds) are appropriate for storage of reuse water and stormwater management if all Department requirements are met. However, the use of ponds for reuse water storage shall not impair the ability of the ponds to function as otherwise intended, such as retention ponds, created as part of stormwater management systems. Any pond that has a direct connection to a surface water body may not be used for reuse water, such as detention ponds.

Fire Protection

Reclaimed water may be used for fire protection purposes. Accordingly, reclaimed water may be supplied to fire hydrants; however, there shall be no connection to potable water supplies. Reclaimed water may also be used to provide water for fire protection in sprinkler systems located in commercial or industrial facilities or buildings; and in motels, hotels, apartment buildings, and condominiums provided workers, guests, or residents do not have access to the plumbing system for repairs or modifications.

Fire protection systems using reclaimed water shall be designed and operated in accordance with local fire protection codes, regulations, or ordinances. If reclaimed water will be used only for fire protection, the Department may approve alternative levels of reliability, operation controls, and operator attendance. This type of reuse will require applicants to provide an affirmative demonstration in the engineering report that alternative controls will provide controls on reclaimed water production equivalent to the full requirements of this section. The engineering report shall include reasonable assurances that public health will be protected. The report shall also document cross-connection control measures and controls on facility operation sufficient to ensure reliable production of reclaimed water of acceptable quality.

ANNUAL REUSE REPORT REQUIREMENTS

After a facility has received an RWBR approval, a requirement to submit an annual report on the total reuse water flow shall be included in the facilities NJPDES permit as

part of the reuse authorization. The following information shall be included in the annual reuse report, which is typically due in February of each year:

- (1) The total flow reused with respect to the total flow treated by the wastewater treatment facility expressed in terms of the percentage flow reused, total flow accepted and total flow reused.
- (2) The total annual flow to each approved reuse location (Name each reuse location.),
- (3) The maximum monthly average flow over the past twelve months for each reuse site, and
- (4) If no flow was sent to a reuse location, the report shall include an explanation as to why flow was not diverted to the particular reuse location.

DEP APPROVAL

The Department shall issue an authorization letter for approval to place a Reuse System into operation once the it has determined that all the requirements, as referenced in this technical manual, have been satisfied. If you have any questions on RWBR, please contact the Division of Water Quality's Bureau of Point Source Permitting Region 1 at (609) 633-3869, Bureau of Point Source Permitting Region 2 at (609) 292-4860 or the Bureau of Nonpoint Pollution Control at (609) 292-0407.

DEFINITIONS

Reclaimed Water for Beneficial Reuse (“RWBR”)

RWBR involves taking what was once considered waste, giving it a high degree of treatment, and using the resulting high-quality reclaimed water for new, beneficial uses. In other words, reclaimed water is used in place of, or as a supplement to, ground water or potable water uses.

Public Access RWBR

Public Access RWBR involves the use of reclaimed water where public exposure is likely, thereby necessitating the highest degree of treatment.

Restricted Access and Non-Edible crops RWBR

Restricted access and non-edible crops RWBR involves the use of reclaimed water where public exposure is controlled; therefore, treatment requirements may not be as demanding as in a public access RWBR system.

RWBR - Agricultural Edible Crop Systems

This use of reclaimed water involves the irrigation of edible crops. The same high-level treatment requirements associated with public access uses also apply to reuse for edible crops.

Industrial RWBR

Industrial RWBR involves the use of reclaimed water in industrial applications such as cooling water and/or washing operations. The uniqueness of each industrial reuse application makes it impossible to establish specific treatment standards.

Operating Protocol

An operating protocol is a document, describing how a wastewater treatment facility is operated to ensure that only reuse water meeting the applicable standards is released to a reuse system. It is a detailed set of instructions for the operators of facilities.

Reuse Supplier and User Agreement

A Reuse Supplier and User Agreement is a binding agreement between the party (e.g., a wastewater treatment facility) who supplies reuse water and the user (e.g., privately owned & operated golf course or any other property owned by another party). The agreement is to ensure that construction, operation, maintenance, and monitoring for the reclaimed water meets the requirements of the NJPDES Rules and Regulations for reclaimed water.

Annual Reuse Report

This is the requirement to submit an annual report on the total reuse water flow from a facility during a calendar year.

APPENDIX A: EFFLUENT REUSE TREATMENT GUIDELINE TABLE

TYPES of REUSE	TREATMENT & RWBR QUALITY	RWBR MONITORING	COMMENTS
<p>RWBR Public Access Systems: Examples include golf course spray irrigation, playground or park spray irrigation, vehicle washing, hydroseeding</p>	<p>Fecal Coliform 2.2/100 ml, 7 day median, 14/100 ml maximum any one sample Minimum Chlorine Residual 1.0 mg/L after 15 Minute contact at peak hourly flow or Design UV dose of 100 mJ/cm² under maximum daily flow</p> <p>5 mg/L TSS maximum, 2 NTU maximum Turbidity in UV applications Total Nitrogen 10 mg/L (1) Hydraulic Loading Rate 2 inches per week (2) Secondary (3) Filtration (4) Permit levels must be met</p>	<p>Continuous on-line monitoring of turbidity and CPO or UV criteria (5)</p> <p>Operating Protocol Required</p> <p>User/Supplier Agreement</p> <p>Annual usage report</p>	<ul style="list-style-type: none"> • A chlorine residual of 0.5 mg/L or greater in the distribution system is recommended to reduce odors, slime and bacterial re-growth. • Chemical (coagulant and/or polymer) addition prior to filtration may be necessary • Loading rates can be increased based on a site specific evaluation and Department approval • Total Nitrogen limitation can be less stringent if site evaluation submitted is approved by the NJDEP • Additional requirements dependant on application
<p>RWBR for Agricultural Edible Crops Systems: Examples include irrigation of any edible crop that will be peeled, skinned, cooked or thermally processed before consumption/Commercially processed foods (8)</p>	<p>Fecal Coliform 2.2/100 ml, 7 day median, 14/100 ml maximum any one sample</p> <p>Minimum Chlorine Residual 1.0 mg/L after 15 Minute contact at peak hourly flow or Design UV dose of 100 mJ/cm² under maximum daily flow</p> <p>5 mg/L TSS maximum, 2 NTU maximum Turbidity in UV applications Total Nitrogen 10 mg/L (1) Hydraulic Loading Rate 2 inches per week (2) Secondary (3) Filtration (4) Permit levels must be met</p>	<p>Continuous on-line monitoring of turbidity and CPO or UV criteria (5)</p> <p>Operating Protocol Required</p> <p>User/Supplier Agreement</p> <p>Annual usage report</p> <p>Annual inventory submittal on commercial operations using RWBR to irrigate edible crop</p>	<ul style="list-style-type: none"> • A chlorine residual of 0.5 mg/L or greater in the distribution system is recommended to reduce odors, slime and bacterial re-growth. • Chemical (coagulant and/or polymer) addition prior to filtration may be necessary • Loading rates can be increased based on a site specific evaluation and Department approval • Total Nitrogen limitation can be less stringent if site evaluation submitted is approved by the NJDEP • Additional requirements dependant on application
<p>RWBR Restricted Access Systems and Non Edible Crops: Examples include irrigation of fodder crops or sod farms or other areas where public access is limited, such as landscaped areas within a secured perimeter</p>	<p>Fecal Coliform 200/100 ml, monthly average, Geometric mean 400/100 ml maximum any one sample (9)</p> <p>Minimum Chlorine Residual 1.0 mg/L after 15 minute contact at peak hourly flow or Design UV dose of 75 mJ/cm² under maximum daily flow</p> <p>TSS (6) Total Nitrogen 10 mg/L (1) (10) Hydraulic Loading Rate 2 inches per week (2)(10) Secondary (3) Permit levels must be met</p>	<p>Submission of Standard Operations Procedure that ensures proper disinfection (7)</p> <p>User/Supplier Agreement</p> <p>Annual usage report</p>	<ul style="list-style-type: none"> • A chlorine residual of 0.5 mg/L or greater in the distribution system is recommended to reduce odors, slime and bacterial re-growth. • Loading rates can be increased based on a site specific evaluation and Department approval • Total Nitrogen limitation can be less stringent if site evaluation submitted is approved by the NJDEP • Additional requirements dependant on application
<p>RWBR for Construction, and Maintenance Operations Systems: Examples may include street sweeping, sewer jetting, parts washing, dust control, fire protection and road milling</p>	<p>Fecal Coliform 200/100 ml, monthly average, Geometric mean 400/100 ml maximum any one Sample TSS (6) Secondary (3) Permit levels must be met</p>	<p>Submission of Standard Operations Procedure that ensures proper disinfection (7)</p> <p>User/Supplier Agreement</p> <p>Annual usage report</p>	<ul style="list-style-type: none"> • Worker contact with RWBR shall be minimized • No windblown spray • Additional requirements dependant on application
<p>RWBR Industrial Systems: Includes closed loop systems. For example, non-contact cooling water, boiler makeup water</p>	<p>Permit levels must be met</p>	<p>Submission of Standard Operations Procedure that ensures proper material handling User/Supplier Agreement Annual usage report</p>	<ul style="list-style-type: none"> • Worker contact with RWBR shall be limited to individuals who have received specialized training to deal with the RWBR systems. • Additional requirements dependant on application

Appendix A Notations

- (1) The Total Nitrogen Limit may be less stringent than 10 mg/L. See report/study requirements in Guidance Manual under Engineering Report Section.
- (2) The Loading Rate may be greater than 2 inches per week. See report/study requirements in Guidance Manual under Engineering Report Section.
- (3) Secondary treatment for the purpose of this manual, refers to the existing treatment requirements in the NJPDES permit, not including the additional RWBR treatment requirements.
- (4) Filtration means the passing of wastewater through a filtration system in order to reduce TSS levels to below the 5 mg/L.
- (5) The continuing monitoring for chlorine produced oxidant (CPO) or UV criteria & turbidity (in either case) is to ensure that all RWBR has been properly treated to the high-level disinfection requirements. The UV criteria include the continuous monitoring of lamp intensity, UV transmittance and flow rate.
- (6) The TSS requirements in the application applies to the existing treatment requirements as specified in the NJPDES permit for the discharge.
- (7) The Standard Operations Procedure is a written document on what methodology has been employed to ensure all the RWBR has been properly disinfected to the required level of 1.0 mg/l CPO.
- (8) Commercially processed food crops are those that, prior to final sale to the public or others, have undergone chemical or physical processing sufficient to destroy pathogens.
- (9) For Restricted Access Spray Irrigation applications the Fecal Coliform 2.2/100 ml, weekly median, 14/100 ml maximum any one sample shall be applicable.
- (10) Applicable limit for restricted spray irrigation applications.

ADDITIONAL SUGGESTED TECHNICAL GUIDANCE DOCUMENTS

The following publications are referenced as additional technical guidance to assist utilities and engineers in planning, design, construction, and implementation of reuse projects.

- U. S. Environmental Protection Agency, 1981. Land Treatment of Municipal Wastewater-Process Design Manual. EPA Center for Environmental Research Information, 26 West Martin Luther King Drive, Cincinnati, Ohio 45268.
- U. S. Environmental Protection Agency, 1977. Wastewater Treatment Facilities for Sewered Small Municipalities-Process Design Manual. EPA Center for Environmental Research Information, 26 West Martin Luther King Drive, Cincinnati, Ohio 45268.

- U. S. Environmental Protection Agency, 1974. Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability-MCD-05. Environmental Quality Instructional Resources Center, The Ohio State University, 200 Chambers Road, Room 310, Columbus, Ohio 43212.

- U. S. Environmental Protection Agency, 1980. Design Manual-Onsite Wastewater Treatment and Disposal Systems. EPA Center for Environmental Research Information, 26 West Martin Luther King Drive, Cincinnati, Ohio 45268.

- U. S. Department of Agriculture, Soil Conservation Service, 1973. Drainage of Agricultural Land. Water Information Center, Inc., 125 East Bethpage Road, Plainview, New York 11803.

- U.S. Environmental Protection Agency. 1984. Land Treatment of Municipal Wastewater - Supplement on Rapid Infiltration and Overland Flow - Process Design Manual. EPA Center for Environmental Research Information, 26 West Martin Luther King Drive, Cincinnati, Ohio 45268.

- Water Pollution Control Federation, 1989. Manual of Practice SM-3. Water Reuse. W.P.C.F., 601 Wythe Street, Alexandria, Virginia 22314-1994.

- American Water Works Association, 1983. Dual Water Systems. Manual M24. A.W.W.A., 6666 West Quincy Avenue, Denver, Colorado 80235.

- U.S. Environmental Protection Agency and the U.S. Agency for International Development. 1992. Guidelines for Water Reuse. Report EPA/625/R-92/004. EPA Center for Environmental Research Information, 26 West Martin Luther King Drive, Cincinnati, Ohio 45268.

- Municipal Wastewater Reuse, Selected Readings on Water Reuse, EPA Center for Environmental Research Information, 26 West Martin Luther King Drive, Cincinnati, Ohio 45268.

- Using Reclaimed Water to Augment Potable Water Resources, Water Environment Federation and American Water Works Association., 1998

- Ultraviolet Disinfection Guidelines for Drinking Water and Water Reuse, National Water Research Institute and American Water Works Association Research Foundation, 2000